The Quality of the Environment in South Carolina

South Carolina Department of Health & Environmental Control

	Percent Change*	Latest Figures		Percent Change*	Latest Figures
The State					
Population	+0.5%	3.69 Million	Vehicles	+3.3%	2,852,990
Vehicle miles traveled (VMT)	+2.4%	39.646 Billion	Facility permits		8,477
The Coast					
Coastal population	+0.3%	866,600	Visitors		17,700,000
The Water					
Miles of rivers & streams assessed		19,487	Assessed waterbodies suitable for all recreational uses		80%
Assessed waterbodies supporting healthy aquatic communities		83%	Watersheds with pollutant loads above permitted limits		0%
Community drinking water systems with no violations		95%	Lakes, rivers & streams usable for drinking water		100%
Community drinking water systems exceeding lead		3.6%	Filtered drinking water systems		99.9%
Population served by community drinking water systems with formal water protection programs in place		.13%	Population provided drinking water from groundwater sources with nitrate concentrations below MCL**		99.9%
The Air					
Population in areas meeting NAAQS$^{\Delta}$		100%	Counties meeting NAAQS$^{\Delta}$		46
Violations of state or NAAQS$^{\Delta}$ (1997)		0	Pounds of TRI† Air Emissions (1995)		51,850,487
The Land					
Area (square miles)		30,203	Urban area		4.7%
Tons recycled	+91%	2,135,164	Tons hazardous waste generated (1995)		196,000
Tons municipal waste disposed	-13%	3,314,728	Pounds of TRI material released to land (1995)		741,224
You *(per person per year)*					
All solid waste		6.9 lbs.	Municipal solid waste	-25%	4.2 lbs.
Miles driven	+2%	10,744			

*change in one year **Maximum Contaminant Level ΔNational Ambient Air Quality Standard †Toxic Release Inventory

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Acknowledgements

"The Quality of the Environment" reflects the hard work of all Environmental Quality Control and OCRM staff whose jobs result in the high level of environmental protection we enjoy in South Carolina. Thanks go to all the front-line staff who collect the data that allow us to evaluate trends and pursue policy that help preserve the state's environment for future generations.

Specific thanks go to a committee of people in DHEC and the Bureaus of Environmental Quality Control who collected, compiled and wrote the information that appears in this report. Thanks also go to all those who answered last-minute questions, proofread and made suggestions that improved the usefulness of this report.

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The Quality of the Environment in South Carolina

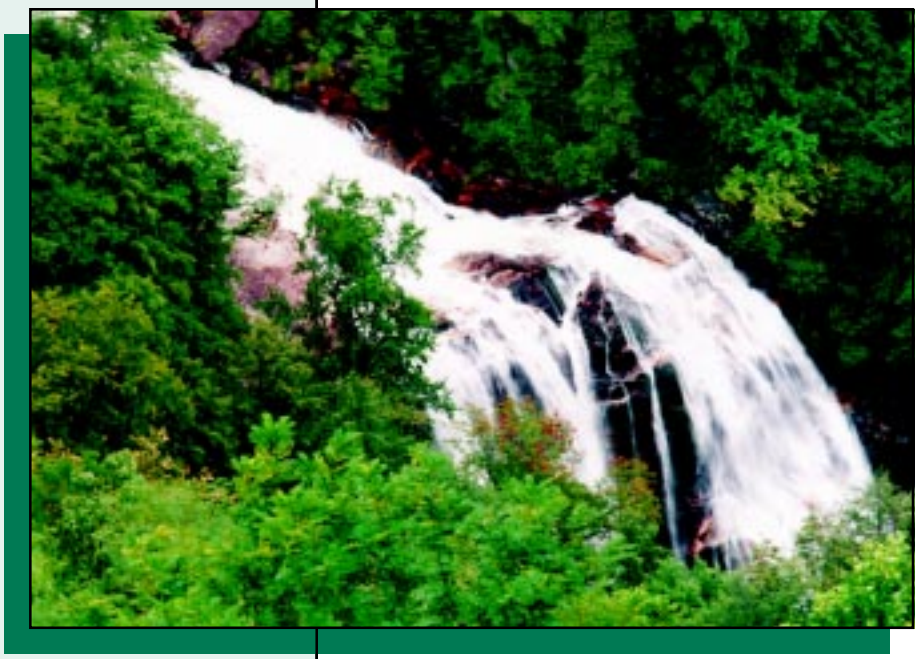
South Carolinians have many ways to experience our environment. From the foothills of the Blue Ridge, following clear trout streams to the Piedmont, and along lakes and blackwater rivers to the coast where land, air and water meet, we can enjoy an abundance of natural resources. Keeping the environment of both the wilder places and the more crowded cities and towns healthy is not only the job of the professionals at DHEC, but the responsibility of all South Carolinians.

Each day every South Carolinian has an impact on the environment. The decisions we make as individuals and as communities can have effects that we are only now beginning to document and understand. The pressure of population growth and urbanization have impacts that are subtle and far-reaching. More roads, parking lots and paved areas increase both the volume and speed of runoff that carries pollutants from thousands of small sources. The reduction of vegetation increases the average air temperatures, which increases the rate of ozone formation. Pollutants in the ground migrate into groundwater and are carried away from the source. The impact of pollutants on air and water quality is being detected hundreds of miles away from the sources. The more we learn about the environment, the more we recognize that it is an Eco*SYSTEM*, and all the pieces support and react to each other.

More and more, the efforts to maintain and improve our environment require us to look beyond our borders. In the past 20 years, we have worked to get our house in order. The obvious and relatively easy sources of pollution have been addressed. Smokestacks have scrubbers, lead is removed from gasoline, discharges are treated or used, and what was dumped is now more often recycled. Today we're finding the activities of all 3.7 million of us and all our visitors are having an equal or greater impact than industry. We are experiencing the effects of more subtle sources and interactions. We are trying to gain an understanding of these interactions so that pollutants that may travel across or through several states, sometimes changing form along the way, are minimized at their sources. Communication, coordination and cooperation both within the state and across the region will be required to continue the progress in improving and protecting our environment.

As the complexity of detecting, measuring and understanding the impacts of pollutants has grown, so has the need to find and use new ways of minimizing the pressure on the environment. "Command and control" has been an effective approach for reducing the impact of facilities or identified point sources. As progress was made, the effort was expanded to include successful recycling, waste reduction and education programs. Active participation in national and regional organizations has become an integral part of any effective environmental program. The nature of nonpoint pollution, long-range transport and pollutant interaction requires different and innovative approaches. Land use planning, mass transit, alternative power sources, incentives to encourage voluntary emissions reductions, and partnerships among governments, industry and the public are all avenues that need to be explored and expanded to continue our progress in protecting and improving the quality of the environment.

Whitewater Falls near Lake Jocassee, South Carolina



Coast

South Carolina's coast is our largest attraction, a fact that should come as no surprise. Our coast is a wonderful place to spend a day or a lifetime — and so one of our greatest assets gives us many of our most difficult challenges. Our 182 miles of sandy beaches, the 200,000 acres of salt marsh and the neighboring Atlantic Ocean are more than a source of top-grade seafood and countless recreational opportunities. This area is the grand interface of land, air and water. In many ways it is our most fragile and pressured resource.

The growth of tourist and permanent populations in coastal South Carolina continues a trend that shows no signs of slowing. People love our coast. They come from all over the world to vacation here, retire here, and start new businesses here. More people, more businesses and more economic development all create more pressure on the environment.

In 1996, 866,600 people lived in the state's eight coastal counties, up from 833,545 in 1990, according to U.S. Census population estimates. Adding to their impact are the approximately 17.7 million visitors the coast hosted last year. By the year 2015, our permanent coastal population is expected to grow by more than 30 percent to 1,133,200 residents. The challenge is to manage this growth so that the beaches, wetlands and waterways aren't overwhelmed by negative byproducts of that growth. We must continue to closely monitor our natural resources, re-evaluate our goals and decide how best to maintain this balance.

Beaches

One way we determine the health of our beaches is to monitor the width of the beach and the size of sand dunes. Contrary to the "thin is in" craze of humans, wider is better for beaches. A wide beach with sand dunes acts as a sand savings account, allowing Mother Nature to make erosion withdrawals. When sand dunes aren't available, she takes private property instead.

In 1996, despite the threat of several hurricanes, there were few erosion-related surprises on the oceanfront. Chronic erosion hot spots — portions of Debordieu, Edisto Beach, Folly Beach, Daufuskie Island, Hunting Island and Hilton Head Island — continued their traditional erosion trends.

The big news on the oceanfront occurred in the Wild Dunes section of the Isle of Palms. Here, an approaching offshore sand bar gave some oceanfront property owners a tremendous gift. Beach width grew by 100 yards. The same sand bar, however, was a nightmare for neighbors for a mile north and south of the attachment area. Sand was taken away from this area as the waves ran around the sand bar. Here, up to 100 feet of beach were lost last year. Add this to the 100 feet that eroded in 1995, and you can imagine the frustration of these oceanfront property owners as they watched this resource wash out to sea.

Property owners used heavy equipment throughout the year to scrape sand from where it is accreting to protect those homes fronting the erosional beaches. This problem appears to be correcting itself on the southern end of the attachment area, but relief has been slower for the northern shoreline. Bulldozers were needed on this beachfront for most of 1997. When the sand bar finally attaches in total, the entire beach should settle down, at least until the next large sand bar forms offshore.

North Myrtle Beach erosion rates were also greater than normal, but the Grand Strand beach renourishment project helped the beach recover to much better than it was in 1996. The Grand Strand project is a massive, $54 million effort to replace beach sand in three phases. North Myrtle Beach, Phase I, was completed in April 1997. Phase II, Myrtle Beach, began May 1997, and Phase III, Surfside and Garden City, began in the fall of 1997. The entire project should be completed by 1998.

Sands of the Grand Strand, Myrtle Beach, South Carolina

The Charleston Harbor Project

We park our car in about the same space every morning. In church, we sit in the same pew week after week. We all have routines and habits that are part of the way we live. Our personal habits are hard to change. Changing an institutional habit can be next to impossible, yet that is what OCRM's Charleston Harbor Project is all about.

This 5-year-old effort is looking at the way man and nature interact in and around Charleston Harbor. Scientists, government and business leaders, environmental groups and recreational users of the harbor are working to create a snapshot of the current situation and coordinated, comprehensive recommendations for the protection and management of the balance between natural resources, economic health and the cultural richness of the area.

The "one regulation fits all" and single-objective approach of the past aren't going to serve us well as our attention shifts to the more complex second generation of environmental problems. The traditional application of the Clean Water Act or the Coastal Zone Management Act has not been up to the challenges of population and development growth in other states, and we can't reasonably expect better results here.

The quality of the environment is the net result of many small, often uncoordinated,

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To keep oceanfront construction away from shifting sands, new development must be built as far landward as practical. The South Carolina Beachfront Management legislation also bans the construction of new erosion control devices such as seawalls, revetments and bulkheads and encourages retreat from highly eroding beaches. It also encourages using beach renourishment as an alternative to armoring the coast. DHEC also promotes dune protection and enhancement projects.

Every year, DHEC's Office of Ocean and Coastal Resource Management (OCRM) charts the changes in the beaches as an indicator of their health. As detailed in the latest report, about 40 percent of South Carolina's coast is stable or increasing, about 40 percent is eroding at less than 3 feet per year, and about 20 percent is eroding at more than 3 feet per year. Contact OCRM for a free copy of *South Carolina's Annual State of the Beaches Report* (April 1997).

Salt Marshes

The health of the nurseries of the sea, as salt marshlands can be called, is another indicator of environmental health. The expansive areas of salt marsh and the shallow tidal creeks that drain them at low tide provide critical nursery habitat for many species of fish, crabs and shrimp. These creeks provide feeding habitat for wading birds and other wildlife and are also used extensively by us for recreation, fishing and aesthetic pleasure. The condition, amount and type of available nursery habitat in the salt marsh has been shown to have a direct relation to the fisheries harvest and environmental quality of the tidal creeks.

The pressures on this resource can be seen in the number of applications for dock permits. OCRM processed 781 dock applications in 1996, 718 in 1995, and 726 in 1994. In the last couple of years the policies regarding dock permitting have been strengthened. No dock walkway can be longer than 1,000 feet, the waterfront property linear footage must be at least 75 feet, with dock size based on creek width, and the construction of the dock must not impede navigation. These evolving policies will help the coastal zone keep its character and allow property owners adequate access to the water.

Add to the dock explosion new marinas and the ever-growing boating population (South Carolina has the fourth largest per capita boat ownership in the nation.), and it is easy to see why docks and any other structures built over this precious resource must receive such intense public and regulatory scrutiny. The issues surrounding docks, however, will continue to be contentious because the answer to "When is enough enough?" is a matter of opinion. People want more docks, and it will be a continuous challenge to balance this demand against the needs of environmental protection.

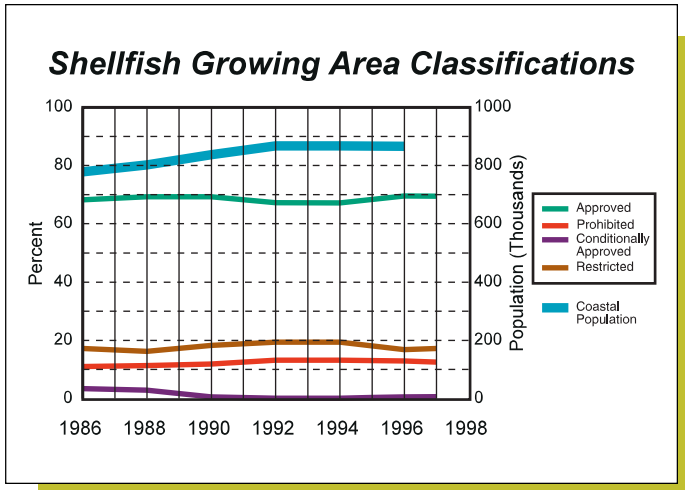
Docks, boats and marinas aren't the only issues facing our marshes. The Charleston Harbor Project is finding that runoff from development is negatively impacting these areas to a greater degree than previously believed.

Several studies that were part of the Charleston Harbor Project (see sidebar) have shown that in order to evaluate the health of the estuary, research projects should focus on shallow tidal creeks, not large-scale systems like the harbor or the rivers. Due to their small size, tidal creeks are the first to be affected by alterations to the watershed, and this makes their health a better indicator of what is occurring in the drainage basin. One study examined 12 undeveloped and 12 developed creeks. This study has shown that the creeks draining developed watersheds experience stressful conditions (increased variability and extreme fluctuations in salinity, less predictable dissolved oxygen levels, and sediment changes) more frequently than those in less developed watersheds.

In addition, the sediments in the creeks were shown to be repositories for pollutants. Trace metals and organic contaminant concentrations were present in sediments at levels known to adversely affect plants and animals in the upper reaches of creeks in developed areas. A wide variety of contaminants were detected including metals, toxic contaminants found in automobile exhaust, and pesticides, often at concentrations measurably higher than in the rivers of the harbor itself. Some measurements near industrial sites were found to have high levels of the pesticide alpha-chlordane. The presence of chlordane is of particular interest since it has not been available for sale since the mid-1970s.

Fifty-six different kinds of shrimp, fish and crabs were collected from tidal creeks in the project area, with juvenile white shrimp comprising greater than 90 percent of most collections. The highest abundance was found in the upper to middle reaches of the creeks, the same areas that contain the highest levels of contaminated sediments. Although the

quantity of these animals did not vary significantly between creeks draining developed areas and the undeveloped reference watersheds, animals collected from impacted creeks were in poorer physiological condition and generally smaller in length and weight.



Shellfish

The majority of the state's 631,589 acres of coastal shellfish growing waters are approved for safe shellfish harvesting. When water quality conditions warrant, an additional 1,107 acres can be opened. Of all potential shellfish harvesting waters, less than 2 percent (9,852 acres) are closed because of poor water quality. More than 73,500 acres are closed as a precaution because of the potential for contamination from nearby marinas or point source discharges.

Pfiesteria

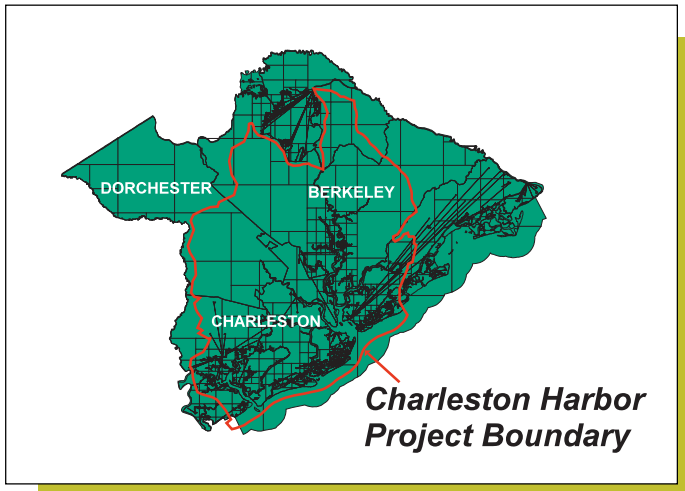
There has been a lot of interest in a microscopic organism found in coastal waters. *Pfiesteria piscicida*, one of a group of algae known as dinoflagellates, is most commonly found along the coast in estuaries. It has been blamed for a number of fish kills in North Carolina. There have been no known fish kills in South Carolina caused by the organism. However, because *Pfiesteria* is active during a fish kill, swimming or eating fish from waters associated with large numbers of dead or dying fish should be avoided. DHEC will continue to work with other state agencies and academic institutions to assess information about *Pfiesteria*'s possible health effects.

Dune Protection

Property owners can obtain free "Please Keep Off the Dunes" signs from OCRM offices in Charleston, Beaufort and Myrtle Beach. Dune walkovers, which prevent foot traffic from wearing down sand dunes, can be built without a permit, provided they meet certain requirements.

General permits allow property owners to bring in sand to build up the dune, plant native dune vegetation such as sea oats and beach grass to stabilize the dunes, and use sand fencing to catch wind-blown sand. Sand fencing must be installed in an approved configuration that prevents nesting sea turtles from becoming trapped.

To assist property owners in developing their sand dunes, OCRM also distributes a "How to Build a Dune" booklet. For more information, call your local OCRM office in Beaufort, (803) 524-6885; Myrtle Beach, (803) 626-7217; or Charleston, (803) 744-5838.



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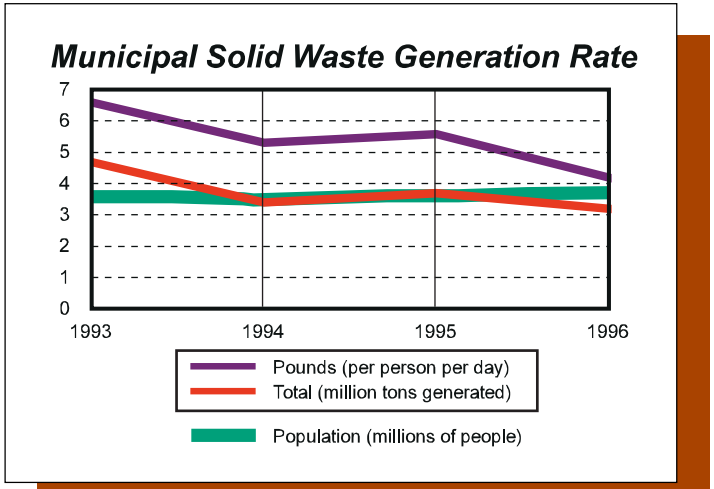
decisions. One Charleston Harbor Project goal is to establish the framework, tools and information to allow coordinated management of all area resources. This effort includes:

- *identification, by the public, of the valued resources in the watershed;*
- *collection of adequate management information on the valued economic, cultural and natural resources in the basin (an inventory, map and assessment);*
- *development and identification of expertise in many specialties of resource management to support decision makers;*
- *developing a greater understanding of natural and social processes that drive management issues;*
- *finding methods to evaluate the success of policies to improve management (i.e., monitoring and evaluating both natural resources and policy effectiveness); and*
- *creating an accessible data storage and manipulation system.*

This is now being done for Charleston Harbor. The work accomplished here may serve as a model for the rest of the coastal zone and possibly the rest of the state. As the research is analyzed, the Charleston Harbor Project will provide policy recommendations to federal, state and local governing bodies on ways the people, the environment, and industry can be better served.

Land

There is a lot of truth behind the saying, "Buy land. They're not making any more of it." The basic limitation of this resource requires us to ask the questions, "How can we best use each unique piece?" "Is this area best occupied by farms, roads, people, waste, or should it be preserved?" "How can we best use and protect what there is and reclaim and reuse what was used or abused before?" As the demand and pressures on land increase, these questions and others should be posed and answered by each local community.

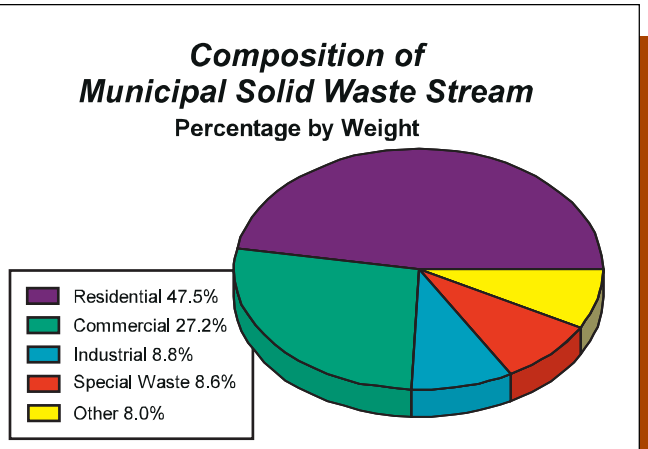


Waste

Municipal Waste

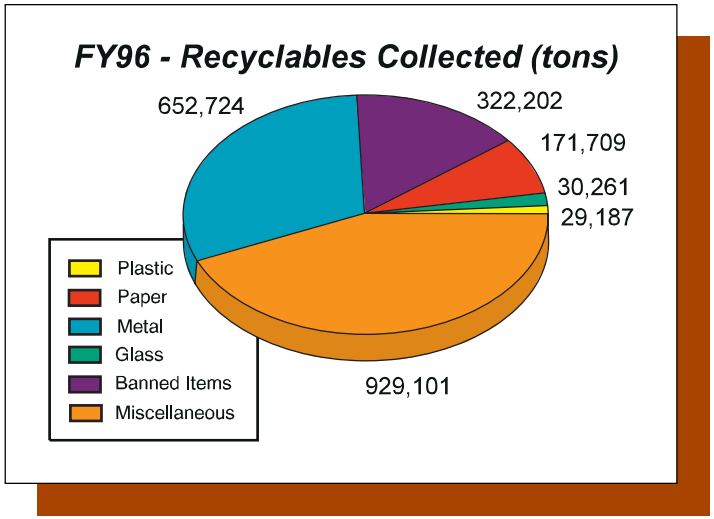
Most often, the final depository for residential and industrial solid waste is a landfill. Residential waste represents the largest portion of South Carolina's and the nation's waste stream, and most is disposed of in landfills or burned at solid waste incinerators. During fiscal year 1996, South Carolinians generated and sent 3.6 million tons of waste to municipal solid waste landfills and incinerators. An additional 352,000 tons of waste were generated outside of the state and accepted by South Carolina facilities. On average, 7 pounds of solid waste is generated every day for each South Carolinian. Four pounds of this are an individual's share of solid waste. The remaining 3 pounds include commercial, industrial and special waste, and construction and demolition debris.

With passage of the Resource Conservation and Recovery Act (RCRA) Subtitle D landfill regulations, more emphasis has been placed on designing and operating municipal solid waste landfills to minimize the environmental impact of this mountain of waste. The increasing financial commitment of landfill owners and operators has led to more regionalization of solid waste management. The laws banning the disposal of potentially hazardous items such as used oil and small, sealed lead-acid batteries and many bulky and recyclable items like whole tires, white goods, automobile batteries, yard trash, and land-clearing debris in these landfills encourage recycling and reuse while reducing the amount of waste being landfilled. Not burying recyclable material allows reuse and will help maximize the life and minimize the impact of the landfills on our natural resources.



Reduce, Reuse, Recycle

In 1991, South Carolina set minimum goals to increase recycling to 25 percent of the solid waste we generate and to reduce the per capita amount of waste deposited in landfills and incinerators by 30 percent. The target date was May 27, 1997. In fiscal year 1996 (July '95 through June '96), 27 percent of our total waste, about 2.1 million tons, was recycled, surpassing the



Solid Waste Policy and Management Act of 1991 goal of 25 percent. We have not been as successful in the efforts to reduce each person's share of the load at the landfill. The most recent available figures show only a 7 percent decrease since 1993. Although the total reduction has been about 27 percent, all of the diversion of construction and demolition waste, land-clearing debris, tires, appliances and yard trash does not count toward meeting the target. Our rates continue to improve, but too much of what we use still ends up in a landfill.

The continuing increase in the amount and proportion of recycling is the result of efforts on many fronts. Statewide, recycling programs are growing in number and quality. More households have curbside recycling, and more drop-off centers have been opened and are accepting a larger variety of materials. Some are also accepting several of the materials banned from landfills: used tires, batteries, waste oil and old appliances. The S.C. Used Oil Partnership increased the amount of waste oil it recovered by 3 percent last year.

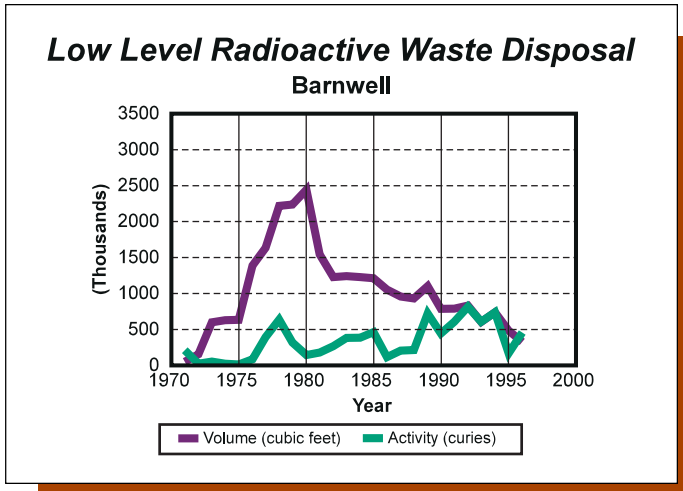
The development and support of public-private partnerships are important parts of this progress. Education programs are helping teach students from kindergarten through high school the importance of using resources wisely. Since 1994, more than 6,000 teachers have been trained in the use of *Action for a cleaner tomorrow: A South Carolina Environmental Curriculum*. During fiscal year 1996, almost $3.4 million generated from fees were awarded to local governments, colleges and universities through six grant programs to support their efforts to reduce, reuse and recycle.

Radioactive Waste

Chem-Nuclear Systems Inc.'s low-level radioactive waste disposal facility in Barnwell is one of two commercial low-level radioactive waste disposal facilities operating in the United States. Since opening in 1971, approximately 27 million cubic feet of waste have been received for disposal. On the 235-acre site, 98.3 acres have been used, and 35.8 acres are still available. The remaining disposal capacity of approximately 7.9 million cubic feet should last, at the present rate of 400,000 cubic feet per year, until the year 2017.

Approximately 8.7 million curies of radioactivity have been disposed of at the site. The radioactivity remaining at the site is about one-third of that (2.9 million curies) due to continuing radioactive decay.

Since January 1996, all wastes have been placed in concrete vaults in below-grade trenches. Three types of vaults are used, all having 8-inch-thick walls and holding from 550 to 750 cubic feet of waste. The waste is processed and packaged before shipment to the site to meet both disposal and transportation requirements. Liquid and hazardous chemical wastes are strictly prohibited from disposal at the site. A carefully designed, multilayer, low water permeability cap is placed over all the trenches after they are closed to minimize the percolation of water through the trenches and prevent the movement of radionuclides such as tritium. All new trenches have improved leachate monitoring systems installed during construction.



1996 Waste Grants

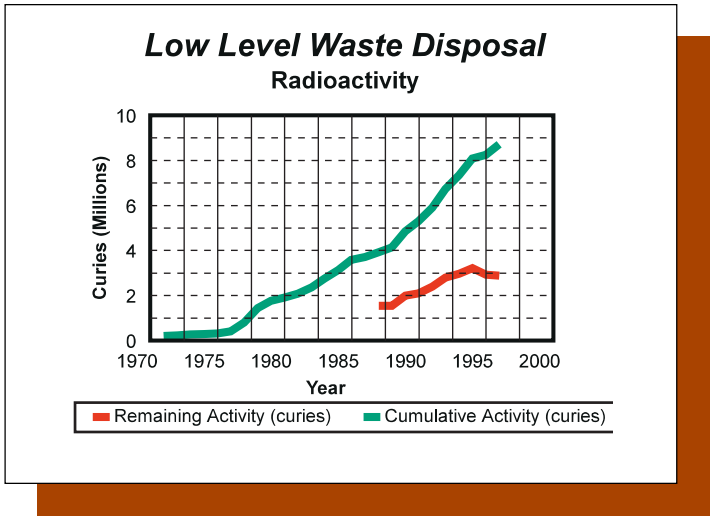
The Solid Waste Management Grant program is used by local governments for a variety of solid waste management projects. Grant programs and the amount awarded are:

- *The Waste Tire Grant Program supports local government recycling and cleanup activities for waste tires ($1.5 million awarded).*
- *The Used Oil Grant Program assists local government projects related to establishing or expanding used oil collection stations, public education efforts or related used oil collection projects ($833,190 awarded).*
- *The Household Hazardous Materials Grant Program, offered during fiscal year 1996, was a program for local governments to designate specific days for collection of household hazardous materials ($74,700 awarded).*
- *The Environmental Education Grant Program supports public and private schools for hands-on projects teaching the importance of reducing and recycling ($156,440 awarded).*
- *The Colleges and Universities Grant Program supports higher educational institutions that wish to establish or expand recycling collection programs or recycling education programs ($168,610 awarded).*

Radiological Technical Assistance

In late 1995, DHEC's Division of Radioactive Waste Management began providing a service for EQC districts and industry. Problems involving any radiological material including unlicensed material, radioactive waste, and its transportation can be reported 24 hours a day. The division has responded to calls precipitated by voluntarily installed detector alarms activated by items such as medical waste, static eliminators, contaminated piping, and other contaminated material. The safe recovery of this material and removal from waste or scrap metal has prevented a small amount of material from contaminating an entire process or product. Contact (803) 896-4240 for additional information.

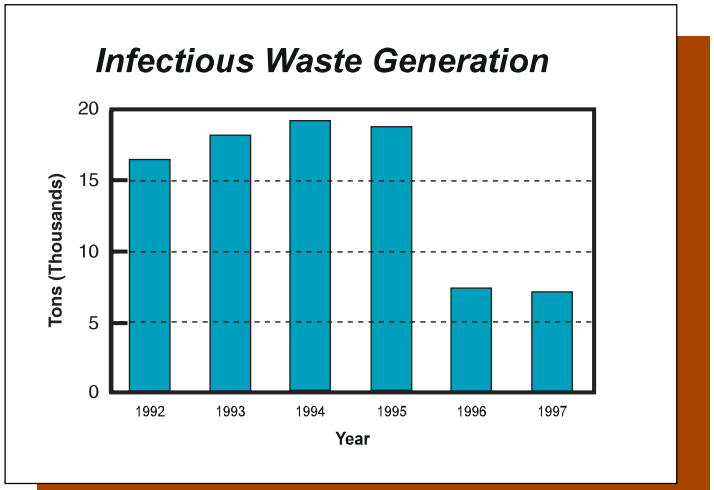
In 1995 the General Assembly allowed the Barnwell site to remain open and placed a $235 per cubic foot tax on all waste received at the site. The facility can accept radioactive waste from generators in all states except North Carolina. Waste from North Carolina is banned because the state failed to make progress on locating a planned replacement regional landfill. Since July 1995, $168.7 million has been collected, of which $45 million has gone to higher education scholarships and the remainder to school improvements.



Infectious Waste

Infectious wastes are materials produced by the health care community in the diagnosis, treatment, immunization or care of human beings, or during autopsies or research. Since the Infectious Waste Management Act was implemented in 1991, waste producers have had to register with DHEC and provide an estimate of the amount of waste they produce.

In 1996, the annual estimate showed a dramatic decrease primarily because hospitals have worked to reduce the amount of waste they produce. Since the late '80s, the number of hospital incinerators in the state has decreased from about 40 to the seven now operating. Many hospitals have chosen to close their incinerators rather than install improvements required to comply with more stringent air pollution requirements. When hospitals began to send more waste offsite for treatment, the additional cost encouraged waste reduction efforts and better segregation of infectious wastes. These efforts have resulted in a reduction in the amount of infectious wastes produced by more than half.



Hazardous Waste

About 10 to 15 percent of all waste generated in the United States is chemically hazardous. In 1996, the 4,074 hazardous waste generators in South Carolina produced 154,000 tons of waste, less than 6 percent of all waste generated in the state. In South Carolina hazardous waste must be moved by one of the 309 DHEC permitted transporters. Most of the material is a liquid and can be recycled or burned as fuel. Solid hazardous waste can be reclaimed, used as a fuel for energy recovery, destroyed in an incenerator, or be disposed of in a specially designed landfill. The 10 commercial hazardous waste disposal facilities in South Carolina include a hazardous waste landfill in Sumter County, an incinerator in Spartanburg County, two cement kilns in Orangeburg and Dorchester counties, and six treatment or recycling centers.

In the spring of 1996, 10 South Carolina counties held Household Hazardous Materials Collection Days around the state, giving residents an opportunity to rid their homes of potentially harmful materials. Cherokee, Chester, Georgetown, Lancaster, Florence, Spartanburg, Berkeley, Charleston, Dorchester and York counties all participated along with several businesses and local industries that were important to the success of these events.

Counties collected 165 tons of hazardous materials including paint, flammable liquids, toxic materials, poisons, asbestos, oil, and caustic or corrosive materials. About one-third of the materials brought in as household waste were recycled.

Brownfield Reuse Breathes Life Into Contaminated Sites

The site looked perfect to officials from Carolina Industrial Services Company (CISCO). It was near a railroad track that could handle carloads of scrap metal they planned to receive. It had several buildings available for storage.

Just one problem: contamination.

The site had been an aluminum recycling facility. During operation, process wastes such as ash and slag were generated and disposed of in an on-site landfill. Other areas of potential contamination included a bladder pond containing waste oil, several other holding and containment ponds, slag and ash piles and several aboveground and underground storage tanks.

The combination of these sources impacted groundwater and soil quality at the site. In 1990, the owners and operators filed for bankruptcy and informed state regulators they could not address the contamination.

The prime industrial property sat vacant until the end of 1995, when CISCO and DHEC's Bureau of Land and Waste Management began talking about a Brownfields project.

Brownfields are abandoned or underutilized property that have actual or perceived contamination and an active potential for redevelopment or reuse. DHEC's approach to Brownfields is a part of its Voluntary Cleanup Program and parallels the Environmental Protection Agency's national effort to empower states, communities, and other stakeholders in economic redevelopment to work together to assess, safely clean up, and sustainably reuse brownfields.

South Carolina's Brownfields focus is on reducing the burden on state funds and personnel for cleaning up contaminated sites. Also, the program supports economic development by providing incentives for third parties to purchase contaminated properties and conduct some level of investigation and/or cleanup activities.

In February 1996,CISCO, in South Carolina's first Brownfields contract, agreed to maintain a cap on the disposal area, close underground storage tanks, dispose of drums and a tanker of waste oil, dispose of slag and ash piles, close the containment ponds, and conduct groundwater monitoring at the Spartanburg County site. So, instead of building a new site on undisturbed land, CISCO got the site it wanted for its metal recycling facility. CISCO also received state CERCLA liability protection, while the state and community got a new business and property returned to productive economic use.

Nuclear Emergency Planning

The state receives more than 60 percent of its electricity from the four nuclear power production facilities in South Carolina. In addition, the Westinghouse Nuclear Fuel Fabrication Facility in Columbia produces fuel for nuclear reactors, and the Savannah River Site near Aiken has operations involving radioactive materials and waste. These six facilities and two others near our borders are required to have detailed nuclear emergency response plans.

South Carolina must be prepared to respond to any incidents involving radioactive materials, whether at these fixed facilities or involving material being transported through the state. In addition to regular exercises and periodic communications drills, all shipments of spent nuclear fuel rods are monitored as they travel through South Carolina. Last year DHEC participated in 137 communications drills and eight scheduled exercises, tracked shipments of spent nuclear fuel, and responded to four actual emergencies. No environmental or public health threats were created by these incidents. This activity is about the same as the amount of drills and responses in previous years.

Site Cleanup

Decades ago it was common practice to dispose of wastes, including hazardous materials, onto or into the ground. Today, those practices still haunt us with groundwater and soil contamination at 24 identified National Priority List (NPL or Superfund) Sites and 568 other identified sites in South Carolina. The sites that are not included in the national program are undergoing further investigation and assessment or have remediation in progress. South Carolina works with the U.S. Environmental Protection Agency to implement the federal Superfund program by performing assessments, providing oversight of response work, and reviewing and commenting on documents submitted by those involved. Also, we contribute 10 percent of the cost of remediation where those responsible for the site or contamination cannot perform the needed work.

The whole process of cleaning up sites with contamination is lengthy, and the costs are great. More than $761,300 in state contingency funds were spent in fiscal year 1996 to perform investigation and cleanup on sites that were not addressed by the federal program.

Voluntary Cleanup Program

South Carolina's expanded Voluntary Cleanup Program allows non-responsible parties to:

1) reduce existing public health and environmental hazards;

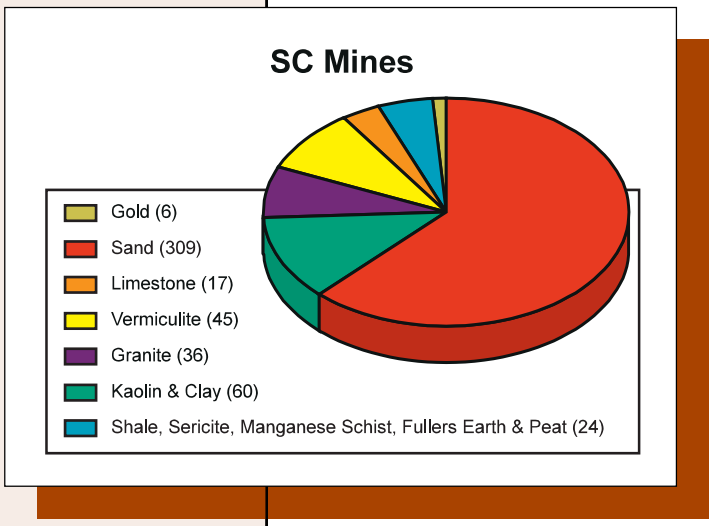
2) conduct remediation to reduce hazards and to encourage redevelopment while making the cleanup consistent with future use;

3) work in cooperation with regulators;

4) return abandoned or underutilized land to productive use; and

5) receive liability protection from the state.

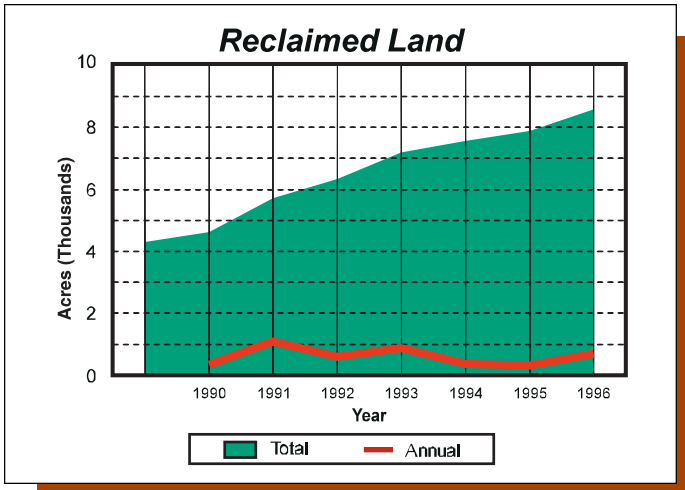
With the 1995 expansion of the Voluntary Cleanup Program (VCP) established in 1988, more of those responsible for contamination, and in some cases an unrelated company that wishes to reuse a site, are performing assessments and remediation. In conjunction with the EPA's Brownfields Redevelopment Initiative, South Carolina's VCP allows a company that is not responsible for the contamination at a site to purchase and perform an agreed-upon assessment and/or remediation at the site and receive protection from state CERCLA liability. This approach encourages the cleanup and reuse of idle or underutilized industrial sites by private parties rather than expending state funds.



Mining

The mining industry in South Carolina produced 14 mineral products during fiscal year 1996 with a total value estimated at $495 million, according to the Mineral Industry Surveys by the U.S. Department of Interior. South Carolina ranked first nationally in the production and sales of vermiculite and second in kaolin.

Currently, about 70,000 acres are under mine operating permits throughout South Carolina. In 1996, 31 new mine operating permits were issued, and a total of 695 acres of mined land were reclaimed, bringing the total reclaimed mine land since the beginning of the Mining and Reclamation program to 8,576 acres.



Mine Reclamation

Reclamation is the rehabilitation of mine land for useful purposes and for the protection of the natural resources of the surrounding area. Mine lands have been reclaimed to a number of various land uses. Grassland, forestland, agriculture, wetland, lakes and ponds, commercial and industrial properties are many of the new uses of a mine site after reclamation is complete. Reclamation of a mine site ranges from simple grading and revegetation to the complex closure of a gold mine where monitoring of the site may extend years after mining ends. To ensure the completion of the reclamation following mining, DHEC currently has more than $19 million in reclamation bonds on file. In fiscal year 1997, an additional 944 acres of former mines were reclaimed.

Reclamation of mined land is greatly influenced by regional and local geology. About 90 percent of mining operations in the lower coastal plain are reclaimed to ponds and lakes because of the high water table. Some examples of beneficial reclamation include:

- A sand mine in Charleston County is now a championship water ski course. The site was engineered to minimize wave disturbance from the ski boats and to control the water level.
- The one peat mine permitted in South Carolina was reclaimed to a lake. The creation of a freshwater lake in this peat bog that covers thousands of acres in area has created a more diverse habitat for wildlife.
- In 1994 Waccamaw Clay received a permit to mine clay on a 200-acre site for its brick plant. Since then, 106 acres have been reclaimed to commercial development, including the sites of Waccamaw Pottery and Fantasy Harbor. They still have 15 acres permitted to mine clay (see back cover).

Water

Water plays an important part in our recreational activities, whether it is enjoying the cooling spray of an Oconee waterfall, fishing in the quiet morning mist or floating down the Edisto on your way to nowhere. This resource is both enjoyable and vital to sustaining life.

Many segments of our economy depend upon the availability of abundant, clean water. Agriculture, industry, economic development and tourism depend on the state's water. The health, safety, and welfare of residents and visitors also are affected by the use or abuse of our water resources.

Water Quality

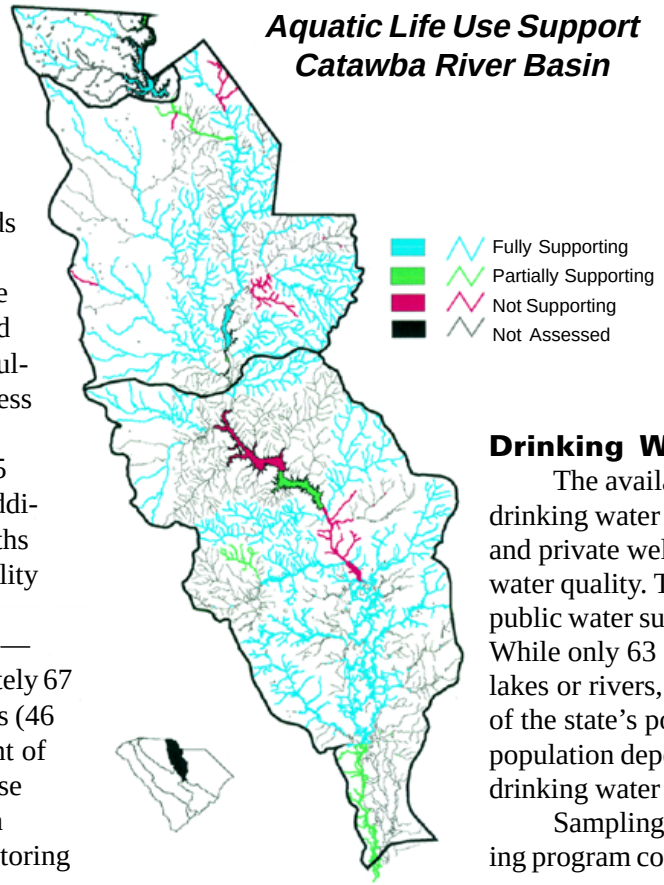
Surface Water

South Carolina has approximately 29,898 miles of rivers, 366,576 acres of lakes, and 682 square miles of estuaries. These waters are classified to define the uses that must be protected and the water quality standards that must be maintained to protect each of those uses. The classifications include support of fish and wildlife, domestic and industrial water supply, recreation, agriculture and navigation. To monitor and assess water quality, surface water sampling is performed monthly at approximately 255 locations. Samples are collected at an additional 301 locations during summer months (May through October) when water quality conditions are most critical.

Of all the state's waters assessed — those monitored routinely — approximately 67 percent fully support their classified uses (46 percent of rivers and streams, 92 percent of lakes, and 62 percent of estuaries). These figures include water quality information collected through watershed-based monitoring on many smaller waterbodies where previously there were no data. Because of changes in EPA assessment guidance, these figures are not directly comparable to previous reports. When the data are summarized for different uses, water quality is shown to be suitable for the support of aquatic life in 83 percent of state waters and recreational use in 80 percent of state waters.

The most frequent water quality problem in rivers and streams is the occurrence of elevated fecal coliform bacteria concentrations, which can affect the suitability for recreational use. In lakes, elevated heavy metal concentrations most often affect use. The most common problem in estuaries is usually concentrations of dissolved oxygen below state standards. The lower concentrations may be a normal and natural occurrence for these coastal waters. The most common source of pollution in all waterbodies is nonpoint source runoff that contains contaminants and sediment.

Aquatic Life Use Support
Catawba River Basin



Drinking Water

The availability of safe and clean drinking water from both public water systems and private wells is an important measure of water quality. There are approximately 2,900 public water supply systems in South Carolina. While only 63 of these systems draw from lakes or rivers, they serve almost 60 percent of the state's population. The rest of our population depends on groundwater as its drinking water source.

Sampling results from the 1996 monitoring program confirm that South Carolina

drinking water quality is exceptionally high. Only 49 of the state's 1,682 federally defined public water systems had violations of drinking water standards. The majority (38) of these systems only had a single violation relating to a one-time occurrence of non-acute total coliform bacteria. The presence of such bacteria is not itself a public health concern, but is an indicator that harmful bacteria could be present. In all cases, the water in these systems was further tested and found not to contain harmful bacteria. Water quality violations for the following parameters were also noted: volatile organic contaminants (1 system); trihalomethanes (3 systems); inorganic contaminants (1 system); radionuclides (1 system); acute coliform bacteria (3 systems); and surface water treatment technique (4 systems). All of the 49 systems have either fully corrected these violations or are under a DHEC action and have begun steps to correct the sources of their problem.

Groundwater

Historically, groundwater quality in South Carolina has been considered excellent. To make sure we can detect trends and changes in this resource, an ambient groundwater quality monitoring network has been developed. Groundwater sampling is conducted annually from selected public and private wells, with each well sampled once every five years. From 15 to 25 samples are collected each year from a total of 105 wells.

The latest data review confirms that aquifers differ in the amounts of naturally dissolved minerals they carry and that differences can occur within the same aquifer in different regions of the state. The amount of dissolved minerals increases as the water in the aquifer approaches the coast. Water in the upper coastal plain is generally free of significant concentrations of dissolved salts and, because of a lack of buffering action, tends to be acidic. In the Piedmont, water samples indicate that a majority of the groundwater's mineral content is developed in the overlying saprolite aquifer, although some changes in water chemistry occur as water migrates through the deeper bedrock aquifer.

Data from the groundwater monitoring network appears consistent with previous groundwater sampling results, confirming that our groundwater quality is excellent and suitable for drinking without treatment in most cases. A summary of the data is published as an annual report in the *South Carolina Ambient Groundwater Quality Monitoring Network*.

Impacts

Pollution Sources

Water resources in South Carolina are threatened by a variety of pollution sources. In the past, the majority of efforts to control water pollution were directed at reducing point source pollution, or pollution that is discharged at a distinct location. More recently, as development and changes in land use have increased, a greater threat to the quality of the state's water resources has come from nonpoint source pollution, or pollution that comes from more diffuse sources. Nationally, if all water pollution from industries and municipal wastewater treatment plants were eliminated tomorrow, this action would stop less than half the pollution that currently enters lakes and streams. Current water quality trends for South Carolina support this national perspective.

Unlike a point source that may originate from a specific discharge pipe, nonpoint pollution comes from various sources. These sources include land and water use activities such as agriculture, construction, logging, septic systems, golf courses, urban and suburban landscape maintenance, runoff from impervious surfaces such as pavement and rooftops, impacts from marinas and boating, household pets, and careless household products disposal. Nonpoint source pollution occurs when rainfall or water flows across or through the ground, picks up pollutants and deposits them in rivers, lakes, coastal waters and groundwater. These pollutants can include sediments, nutrients, pesticides, bacteria from animal waste, trash, vehicle fluids, heavy metals and other toxins. Reduction of nonpoint source pollution in South Carolina will depend heavily on modification of current land and water use practices.

Groundwater Contamination

The quality of groundwater beneath known waste sites is always a concern. Monitoring groundwater quality at municipal, industrial and hazardous waste landfills is a permit requirement for all owners and operators of such sites. Increased design requirements for new landfills are in place

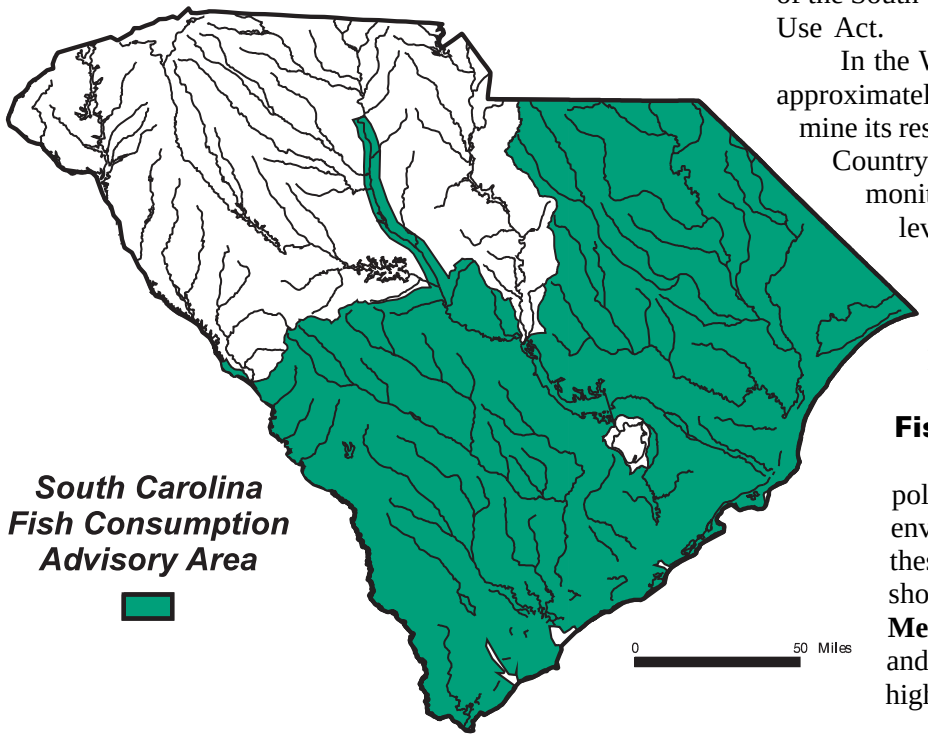
Nonpoint and Point Sources

Long-term trends in many important water quality indicators show that water quality has been maintained or improved for the majority of South Carolina's waters. Some pollutant indicators, such as biochemical oxygen demand (BOD), reflect point source discharges and are strictly limited by National Pollutant Discharge Elimination System (NPDES) permits issued since the passage of the Clean Water Act. BOD is a measure of how much oxygen is consumed in the biological processes that break down organic matter in water.

Other indicators are generally not related to point sources, but are more indicative of nonpoint source runoff. Turbidity, a measure of how cloudy water is, indicates that more runoff is getting into streams unfiltered by vegetated areas and decreasing water clarity. Sediment not only increases turbidity, but can fill channels; impede sunlight, which hinders aquatic plant growth; adversely affect aquatic life; and transport excessive nutrients and pesticides. Increasing amounts of paved surface, such as parking lots and roads, also increase the rate at which runoff reaches streams. Because of impervious surfaces such as pavement and rooftops, a typical city block generates nine times more runoff than a woodland area of the same size.

to reduce and minimize future occurrences of groundwater contamination. Where groundwater contamination exists at abandoned sites as well as permitted sites, efforts are made to determine how widespread and significant the contamination is, what action should take place to control and correct the contamination, and to make sure any risk of exposure is minimized.

Groundwater can be contaminated by various sources. As of August 1997, there were 3,330 documented impacts to groundwater. The majority of releases occurred from leaking underground storage tank systems that provide petroleum and chemical products used by individual consumers and industry. The second most common source is accidental releases (e.g. spills and leaks) to the environment, which eventually impact groundwater. These are usually petroleum-based products used for either machinery maintenance or manufacturing. The third most significant source of contamination to groundwater is caused by leaking pits, ponds, and lagoons. This type of containment is used by many industries to dispose of or treat byproducts generated during the manufacturing processes.



Groundwater Capacity Use

The South Carolina Coastal Plain includes nearly 28 counties from the fall line to the shoreline of the Atlantic Ocean, an area of approximately 20,000 square miles. Groundwater users in the South Carolina Coastal Plain withdraw approximately 350 million gallons per day from aquifers. These withdrawals are expected to increase to nearly 500 million gallons per day by the year 2020.

As a result of increasing groundwater withdrawals, water levels in aquifers are declining in some areas of the Coastal Plain. Continued withdrawal of freshwater faster than the aquifer is recharged may lead to saltwater intrusion in the coastal portion of the aquifers.

To understand the relationship between groundwater withdrawals and water level declines, DHEC monitors or reviews data for numerous wells in the South Carolina Coastal Plain. In areas where the aquifer is near depletion or could be depleted because of unique geological conditions, a capacity use area may be declared, and, with legislative approval, permits must be obtained to allow withdrawal of groundwater if the use exceeds 100,000 gallons per day. This type of management is being done in two capacity use areas of the South Carolina Coastal Plain under the Groundwater Use Act.

In the Waccamaw Capacity Use area, DHEC monitors approximately 80 wells in the Black Creek Aquifer to determine its response to changing pumping patterns. In the Low Country Capacity Use area, more than 300 wells are monitored in the Floridan Aquifer for changing water levels. In addition, 35 to 50 wells are monitored for changes in chloride concentration occurring from seawater intruding into the aquifer where water levels have declined below sea level.

Fish Consumption Advisories

Toxic substances such as mercury and polychlorinated biphenyls (PCBs) persist in the environment and can accumulate in fish. When these pollutants are detected at concentrations that should concern consumers, an advisory is issued.

Mercury — In South Carolina, fish from 18 rivers and nine lakes or ponds contain mercury at levels high enough to prompt human health warnings and

Reducing Nonpoint Source Pollution

No matter where we live in South Carolina, our daily activities contribute to nonpoint source (NPS) pollution. When it rains, pollutants are transported from our homes, businesses and farms to surface and groundwater supplies. Here are some actions an individual can take to reduce NPS pollution.

Home & Household

- *Properly maintain septic systems.*
- *Purchase less toxic cleaners and properly dispose of cleaners and paints.*
- *Clean up after pets.*

Lawn & Garden

- *Use plants native to your area. They often require less water and fertilizer.*
- *Landscape so that plants can filter pollutants and reduce runoff.*
- *Keep fertilizers off driveways and walkways.*
- *Have the soil tested to determine fertilization needs.*
- *Compost leaves, grass and clippings.*
- *Cover bare soil with vegetation or mulch.*

Automotive

- *Don't drain used motor oil or automotive fluids into storm drains.*
- *Service your car regularly.*

A free booklet: "Turning the Tide, a citizens guide to reducing nonpoint source pollution" is available by calling (803) 734-0866.

Nitrate

Nitrate is a naturally occurring inorganic compound that makes up part of the nitrogen cycle. Small amounts of nitrate are always going to be present in the environment; however, human activities can significantly impact these concentrations. Municipal and industrial wastewater can be major point sources for nitrate, while septic tanks, the use of fertilizer on soils, and animal operations are among the main nonpoint sources. Elevated concentrations of nitrate in drinking water are primarily a concern for infants and pregnant women. Infants are at risk of developing methemoglobinemia or the "blue baby syndrome." This is characterized by shortness of breath and blueness of skin and can lead to death.

None of the tests of the state's community drinking water systems revealed any exceedence of maximum contaminant level concentrations.

consumption advisories. If ingested in large amounts, mercury can cause brain damage in adults and can damage the brains of developing fetuses.

The source of mercury contamination in fish is not clear. Naturally occuring mercury may be partially responsible for the levels found in fish tissue. Another source is deposition from the air, a result of the combustion of fossil fuels. There are no data available indicating mercury in wastewater discharges as a major source of mercury in fish in South Carolina. Naturally occurring low pH, low hardness, low alkalinity and low dissolved oxygen levels commonly found in our coastal plain swamps and blackwater streams promote the transformation of inorganic mercury into methylmercury, the form most readily accumulated by fish. Because of this, and because fish move around, the fish consumption advisories should be considered to apply to the tributaries of waterbodies with advisories.

South Carolina is not the only state where mercury is showing up in fish. More than 40 other states are also seeing elevated mercury levels and have issued advisories. States are working together with the U.S. Environmental Protection Agency to try to identify the cause or causes of mercury in fish.

PCBs (Polychlorinated biphenyls) — Fish consumption advisories due to PCBs have been in effect for Lake Hartwell since 1976 and for Langley Pond in Aiken County since 1986. In both instances, the contamination sources are historic industrial use and discharge of PCBs. The manufacture and use of PCBs were banned in 1979, but this class of compound does not break down easily in the environment. If ingested in large quantities, PCBs can cause bronchitis, bursitis, sensory neuropathy, inhibition in growth and abnormal teeth in children, and low birth weight babies.

Radionuclides — In 1996, DHEC expanded its fish consumption advisory to include all fish in a portion of the Savannah River from Beech Island in Aiken County downstream to the Webb Wildlife Center in Hampton County. Fish testing has shown elevated levels of two radioisotopes, Cesium-137 and Strontium-90. Releases of the two isotopes occurred because of past practices at the Savannah River Site. The advisory is for fish only and does not affect drinking water quality. The isotopes can cause birth defects and cancer.

Watershed Approach

DHEC protects and manages the state's water resources and allocates and coordinates water quality activities using a watershed-based approach. A watershed is a geographic area enclosed by a topographic ridge from which direct surface runoff from precipitation normally drains by gravity. The state is divided into five major drainage basins for management purposes: Savannah-Salkehatchie, Saluda-Edisto, Catawba-Santee, Pee Dee, and Broad. The watershed approach involves a five-year cycle of water quality monitoring, data assessment and watershed water quality management strategy development, wasteload allocation and permitting, and continuous implementation of watershed plans addressing water quality concerns within the basin. Public participation is emphasized throughout the cycle. Watershed staff hold public meetings and work with local groups and citizens as stakeholders to identify water quality concerns and take steps to improve impaired waters.

Surface Water Classification Upgrades

Eastatoe Creek and its tributaries in Pickens County as well as Cape Romain, Bulls Bay and surrounding coastal waters in Charleston County were upgraded in 1997 to Outstanding Resource Water (ORW) classifications. This classification includes waters that constitute outstanding recreational or ecological resources. With these reclassifications, there are now 99 waterbodies in South Carolina that have at least some portion classified as ORW. Discharge of domestic, industrial or agricultural waste, and open water dredge spoil disposal are prohibited to ORW waters. Direct stormwater and other nonpoint source runoff and discharges from waste treatment facilities upstream or in tributaries are only allowed if they do not affect existing water quality.

Special Studies

DHEC and Beaufort County Council are cooperatively funding a special study of the Broad Creek and Okatie River that will be conducted by DHEC, the Department of Natural Resources (Marine Resources Division), and the National Marine Fisheries Service (Charleston Laboratory). The purpose of the study is to determine current water quality and ecological health in these two coastal areas so that a baseline can be established. The study was recommended by the Clean Water Task Force, which is a volunteer citizens group working to protect and restore the waterways of Beaufort County. This type of grassroots effort is an excellent example of how citizens, DHEC, and other state agencies can work together to address important environmental issues.

Air

The air is our constant, invisible companion. We breathe it, live in it, and rarely give it a thought. It is that part of the environment that we most intimately contact. The material it carries, from pollen to pollutants, impacts us directly with each breath and indirectly through its influence on the health of the land and water.

South Carolina remains one of few states where the quality of the air meets or exceeds all of the National Ambient Air Quality Standards (NAAQS). The six pollutants that have national standards are: Ozone (O_3), Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Particulate Matter (PM), Carbon Monoxide (CO), and Lead (Pb).

Review of Standards

In the past year, several of these pollutants and their associated national standards have undergone rigorous review. The U.S. Environmental Protection Agency is required to periodically review each standard to ensure that the level of protection is adequate, based upon the best current scientific health information.

Sulfur Dioxide

Most sulfur dioxide is released into the atmosphere by the combustion of sulfur-containing fuel, primarily coal. After reviewing information on the effects of sulfur dioxide exposure, the EPA decided to retain the existing standard with only minor technical changes. The measured SO_2 concentrations in South Carolina remain well below any level of concern, averaging less than 10 percent of the standard.

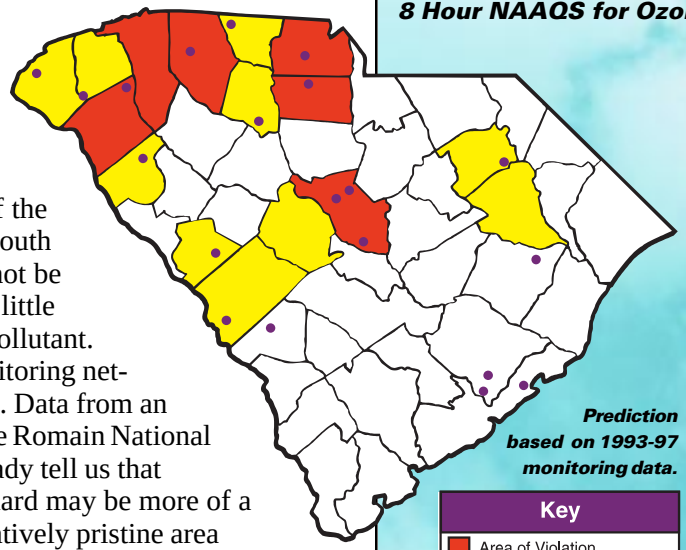
Ozone

The most prevalent air pollutant in the nation and in South Carolina is ground-level ozone. It is the prime ingredient of smog in urban areas. Ozone is not emitted directly into the air, but is a secondary pollutant formed when nitrogen oxides combine with volatile organic compounds in the presence of heat and sunlight. After a review of the most recent research, the EPA has set a new standard at a lower concentration and a longer averaging period. Several South Carolina counties are likely to have ozone concentrations that violate the new standard (see map). The single greatest contributor to the afternoon ozone peak in our urbanized counties, other than our hot summer days, is the emission of nitrogen oxides (NOx) and volatile organic compounds (VOCs) from automobiles during morning rush hour.

Particulates

In the 27 years since the original Clean Air Act established the NAAQS, the standard set for the amount of dirt in our air has been revised to reflect continuing improvements in air quality and a better understanding of the potential impact on our health. In 1970, the Clean Air Act established a standard for total suspended particulate (TSP). As particulate sources became more controlled and concentrations in the air were reduced, smaller particles became the focus. The resulting change of the standard to particulate matter less than 10 microns in size (PM_{10}) redirected efforts toward reducing emissions of these particles. The latest review of the particulate standard has resulted in an additional air quality standard for even smaller particulates. The NAAQS for $PM_{2.5}$, the very fine particulate 2.5 microns and less in diameter, was issued in July 1997. The current PM_{10} standard has been retained with a few minor changes. The impact of the very fine particulate standard on South Carolina or the United States cannot be accurately predicted since there is little monitoring data available for this pollutant. Starting in 1998, a new $PM_{2.5}$ monitoring network will begin to collect samples. Data from an existing monitoring site in the Cape Romain National Refuge in Charleston County already tell us that meeting the finer particulate standard may be more of a problem than expected. In this relatively pristine area with few local impacts, the measured concentration averages two-thirds of the new annual standard. Other studies have shown a significant portion of $PM_{2.5}$ mass collected is due to particulates formed by chemical reactions in the

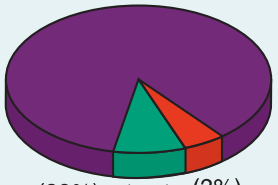
Potential Impacts of New 8 Hour NAAQS for Ozone



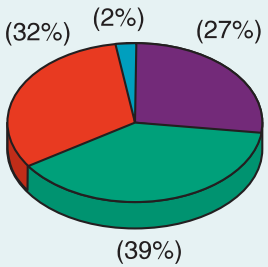
Prediction based on 1993-97 monitoring data.

Emission Sources

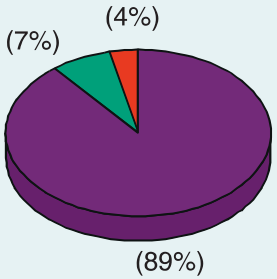
Carbon Monoxide



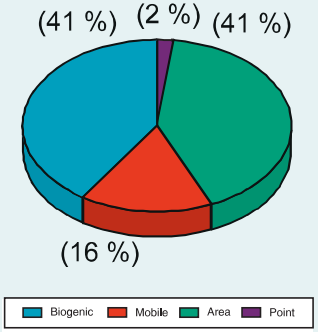
Nitrogen Oxides



Sulfur Dioxide



Volatile Organic Compounds



atmosphere, very much like ozone formation.

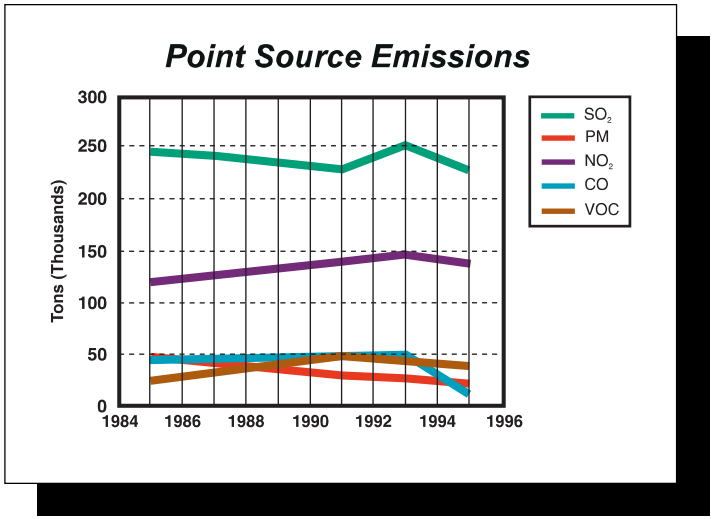
Regional Haze

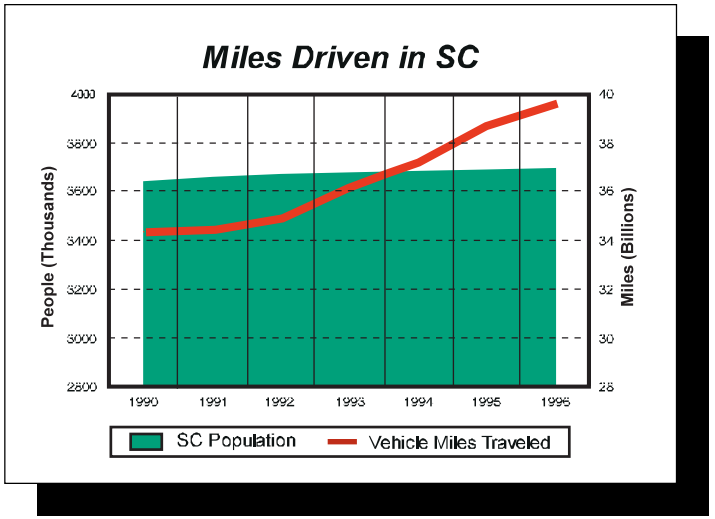
Visibility may be described as the farthest distance a person can see or how well scenic vistas or landscapes can be viewed and appreciated. When visual air quality is impaired by air pollution, the human eye perceives a loss of color, contrast and detail. The haze we see is the result of many complex reactions involving moisture, sunlight, nitrogen oxides, sulfur dioxide, smoke, ozone and organic compounds.

Due to the normal weather patterns in the southeast, South Carolina experiences large numbers of stagnant air conditions. All too often, emissions from our urban areas, power and manufacturing facilities and forests, along with pollutants that may have traveled long distances, combine and react in the hot stagnant air to form ozone, $PM_{2.5}$ and the familiar summer haze. As we understand more about the interrelationships of pollutants in the atmosphere, the need to coordinate control strategies across states and regions becomes more important. The effort to reduce the visual impact of air pollution will include almost all the criteria pollutants mentioned previously. EPA has announced that it will look at integrated ways of addressing these problems.

Emissions

Monitoring air pollutant concentrations allows us to measure what people are exposed to, but we can't monitor everywhere. The load that our activities place on the environment's health can be estimated, and progress in reducing that load can be measured using emission data and estimates. In the past an inventory of emissions has focused on emissions from "point sources" or smokestack industries. However, point sources are only part of the load. Every day each of us contributes a little to air pollution. That little bit times our population of 3.8 million makes up a significant portion of the emissions of CO, NOx and VOCs. We are driving more each year. Automobiles, or mobile sources, are the biggest contributor, but everything from the lawn mower to drying paint adds a little bit.The estimate of the contribution





from the thousands of activities that make up area emissions includes sources from small businesses, including gas stations, to our housekeeping and recreation. Even nature adds to the total. Biogenic sources (trees and other vegetation) are major contributors to VOC and NO_2 emissions during the summer.

Measuring or estimating the emissions from a point source is fairly straightforward. But how much of what is emitted comes from the 365,000 cars, trucks, buses and motorcycles around Richland and Lexington counties? Or the 460 square miles of forest in Spartanburg County on a 92 degree, cloudy day? In order to understand the makeup of the resulting "chemical broth," and what can be done to minimize the formation of secondary pollutants like ozone and fine particulate, we have to add the best estimates of the many small and nonpoint emissions to the ones we know. The

development of better emissions inventories is important for a wide range of activities, from determining the permit fees for sources (set at $31.78 per ton for 1997) to providing the best quality data for local, state and regional efforts to devise the best approach toward environmental quality goals.

Deposition

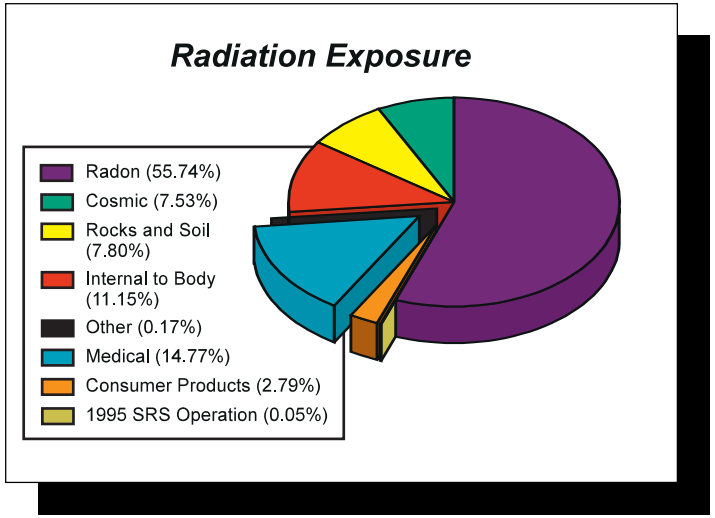
Deposition in the 1960s was the dirt, ash and soot that fell on your house, your car, and clothes on the clothesline. Over the next 30 years the definition expanded along with our understanding of how the material that fell or was washed from the air affected us. In 1997, most sources of particulate had been eliminated or controlled, but the deposition of pollutants from the atmosphere still has an impact. Acid rain was one of the first air pollutant deposition problems identified. Acid precipitation, which includes snow and fog, can damage buildings and property, dissolve and wash metals from soil into lakes and streams, and affect the health of plants and animals. Reductions in SO_2 emissions across South Carolina and the nation have contributed to small but steady declines in the acidity of precipitation measured in South Carolina.

Deposition of mercury from the atmosphere is contributing to fish in 47 states having elevated mercury levels, including fish from 18 South Carolina rivers, lakes and streams. South Carolina was one of the first states to join a national precipitation network collecting samples for mercury. Early results indicate slightly higher deposition rates than at the nearest samplers in other states. The lack of major sources of mercury in South Carolina and the increasing deposition rates toward the large sources in the Ohio River Valley support the theory that mercury can be transported long distances before deposition. More study and sampling will be needed to confirm these findings. You can visit the National Air Deposition Program website at http://nadp.nrel.colostate.edu/nadp/ for more information.

Radiation Exposure

The most likely source of exposure to radiation in South Carolina is radon. This naturally occurring gas is most commonly detected in the upstate where radium is more common in the soil and rocks. Houses built on slabs or with basements are more likely to have higher radon concentrations. DHEC and the EPA recommend that your home be tested for radon. A statewide toll-free radon hotline at 1-800-768-0362 (in Columbia, 734-4631) is available to provide a list of firms that measure radon or provide consulting services.

South Carolina's 10 major facilities where radioactive material is used and processed continue to operate with minimal release of radiation to the environment. Less than 0.1 percent of the 22,000 air, water, soil, vegetation, fish and milk samples analyzed last year detected radiation above any limits or guidelines. Naturally occurring radon and radium were responsible in those few samples.



SAMI

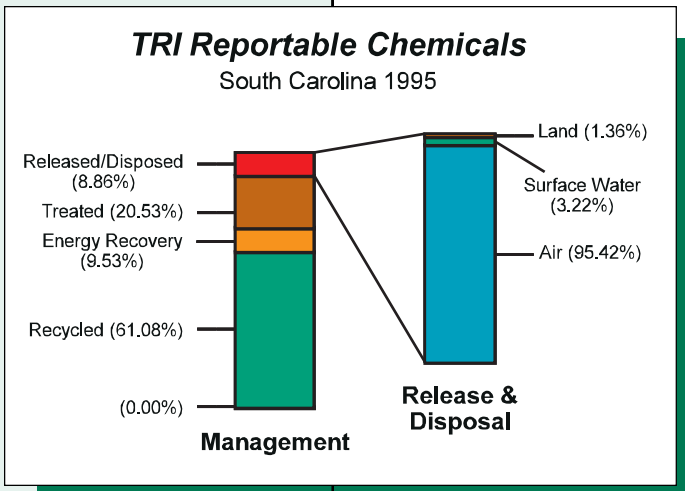
The southern Appalachian Mountains, stretching from Alabama to West Virginia, contain some of the nation's most beautiful scenery and prized natural resources. A decline in air quality can impair this beauty and threaten its diverse environment. SAMI (Southern Appalachian Mountains Initiative) is a voluntary, nonprofit partnership of state environmental regulators, federal agencies, industry, academia, environmental organizations and other stakeholders in the eight states of the region. SAMI's focus is to identify and recommend reasonable measures to remedy existing — and to prevent future — adverse effects from human-induced air pollution on the air quality-related values of the Southern Appalachians.

OTAG

The Ozone Transport Assessment Group (OTAG) comprised of 37 states, the District of Columbia and the EPA, organized to study the eastern United States transport of ozone and the chemicals or emissions — primarily nitrogen oxides and volatile organic compounds — that react in sunlight to form ozone. OTAG's goal was to identify and recommend a strategy to reduce transported ozone and its causes which, in combination with other measures, will enable the region to stay within air quality standards. OTAG findings and recommendations may be used to help formulate regional approaches to ozone reduction.

Indicators

Every day we are presented with an increasing number and variety of indicators. Wind chill, heat index, Dow Jones, NASDAQ, Pollutant Standard Index and pollen index are just a few we see on the evening news. They provide a quick representation of large amounts of information and, possibly, a way to track a trend. The use of indicators to represent environmental quality isn't new, but the quantity in use and their importance have grown dramatically in the last few years. The progress toward national environmental goals is now beginning to be measured by indicators. The working relationship between federal and state environmental programs will in part be defined by the achievement of environmental results as measured by environmental indicators.



Every useful indicator is a condensation of data and is designed for a specific purpose. In the progression from raw data to an index, details are lost. What is useful to policymakers may be too detailed for the evening news, but too vague for an environmental scientist. The use of any indicator requires some understanding of the original intended use and the quality of the underlying data. The DOW is an accurate measure of the value of a group of selected stocks. It was defined in the 1930s to include specific segments of the economy and indicate the strength of the economy. It was an indicator of the stock market's overall performance, if you assumed all stock values generally follow that group. It is not very likely to be a good indicator for any particular stock you may follow. Likewise, any particular environmental indicator may be a good general indicator for some purpose, on some scale, but may not accurately describe your particular community.

Indicators are used to measure the administration, the activity or performance of an environmental program, and the ultimate results of that effort, the quality of the environment. Indicators that are useful to measure the quality of the environment can generally be placed in three categories:

- **Pressure** — What is the load we are placing on our environmental resource? How many people, how far we drive, how much we discard, or how much we use.
- **State** — What is the condition and quality of a resource? What are the concentrations of pollutants in the air, the water, or the fish? Does that concentration limit the use of the resource?
- **Response** — What and how much are we doing to respond to an environmental impact or need? How much do we reduce, reuse and recycle? What is the change in emissions to the air and water as the result of our efforts?

Three of the most widely used environmental indicators are:

- **TRI** (pressure)(response) The **Toxic Release Inventory** may be the best known environmental indicator, reported widely in the press every year. It was intended to increase awareness of how and where toxic material is used, treated and released. The complete report includes a wide variety of information about the load on our environment from releases and the progress in reducing those releases. Unfortunately, the list of compounds reported, minimum amounts, and industries included changes annually, which makes any comparison of total releases from year to year very difficult. The amounts reported are only a total and do not reflect the relative toxicities of the compounds included.
- **Water Quality Assessment** (state) A widely used general assessment of the condition of South Carolina's waters, including rivers, streams, lakes and estuaries, is often referred to as the **305(b) report** after a section of

*See **Indicators**, Page 21*

Community Involvement

DHEC's commitment to community involvement extends beyond the requirements of regulations to include the principle that better decisions are made when everyone who is affected by those decisions is involved in the process. Community involvement is visible evidence of our value on customer service and the recognition that every involved citizen becomes an extension of our surveillance network, alerting us to existing and potential environmental problems.

Community involvement takes many forms, from informal discussions with individuals and neighborhoods to formal public hearings. It may have a nonregulatory focus, for example, citizen input into watershed planning and non-point source pollution prevention; be site-specific, concerning a permitting or cleanup decision; or be a part of broad problem-solving that can include regulatory strategies, for example, the pilot Community-based Environmental Protection project in Charleston.

The Charleston Community Based Environmental Project (CCBEP) is a partnership among DHEC, local governments, the EPA, the Medical University of South Carolina (MUSC), and the communities in the area to address health and environmental issues of concern to the citizens. In the next two to three years, the project will attempt to improve the total environment that the citizens live in, including their physical health and well-being, as well as the social, economic, and environmental health of their surroundings. Both DHEC and the EPA will provide support to the overall mission of the project, with an emphasis on improving the environment of the area.

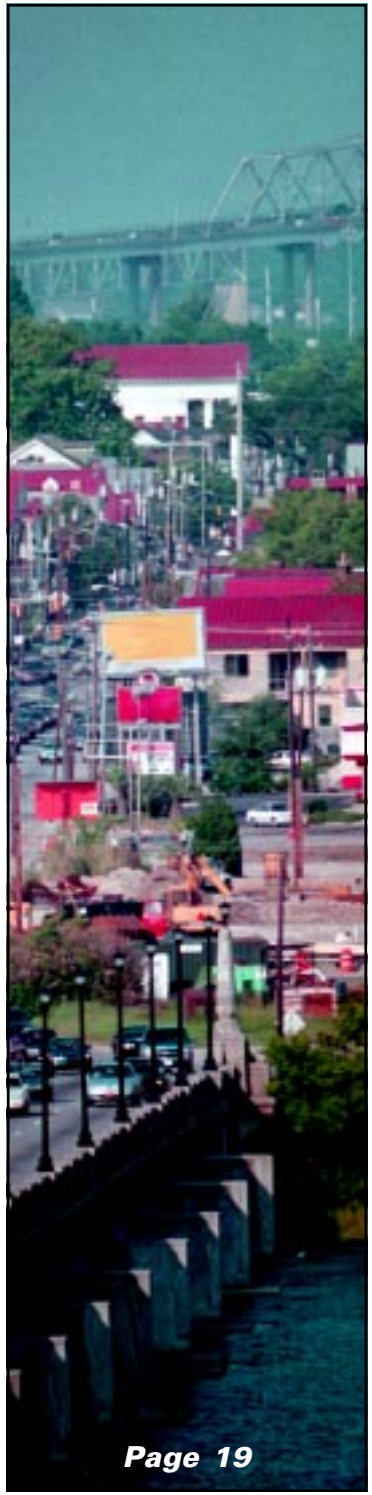
The CCBEP initiative will seek to bring together all appropriate levels of government across all media programs to characterize the area's environmental problems, establish environmental goals and indicators, and develop solutions to those problems by bringing members of the community together with government representatives, industry leaders, environmental advocates and others. Because community members will be involved in the goal-setting and decision-making processes, the solutions to the problems will take into consideration the economic, public health, and ecological concerns of the community.

The Environmental Permitting Process

A business may have to obtain a permit from the state to construct, modify and operate a facility in South Carolina. Typically, the permitting process begins with the submission of an application to DHEC. The application is reviewed for completeness, and, if necessary, additional information is requested from the applicant. When complete, the application is reviewed and the draft permit written containing the conditions and requirements necessary to ensure that emission and discharge limits are met. The draft permit and application are then placed on public notice for 30 to 45 days to allow an opportunity for the public to comment on the technical aspects of the draft permit. If no pertinent comments are received during this period and a public hearing has not been requested, then DHEC will issue its permit decision. All permits are effective 15 days following the date of the decision unless a request for a contested case hearing is made. Final permit decisions can be appealed and will be reviewed by an administrative law judge, the Coastal Appellate Panel, or the S.C. Mining Council depending on the permit.

Due to differences in the requirements of the different programs and state and federal regulations, there can be many variations in the process. The time allowed or the need for public notice, requirements for notification of adjacent landowners, and need for hearings depend on the type and scope of permit requested. Certain common activities can be addressed with a general permit. Typically, the applicant and/or permittee obtains coverage by simply completing an application and submitting it to the agency.

The status of most permit applications can be found on the EQC electronic bulletin board at (803) 734-3752.



The busy urban landscape of Charleston, South Carolina

The tranquil waters of Lake Jocassee, South Carolina

Challenges

Communication and Education

The challenges of preserving and protecting the environment are often complex and difficult. An understanding of the potential impacts on individuals, communities, and the environment that can accompany population growth and new industries must play a part in all the decisions that shape our future. Citizens, local governments, businesses and regulators all have their parts to play in those decisions. Open communication and an understanding of the part that each group plays will be necessary to find the best outcome. DHEC is committed to helping communities identify their strengths, needs and priorities and support the processes that can lead to discoveries of local solutions to local problems. Active communication and explanation of the processes involved and the responsibilities and limitations of DHEC's role will help all concerned focus their efforts.

Private Drinking Water Wells

Although public drinking water supply wells require a permit from DHEC, wells installed for residential use do not. The permitting process was designed to help ensure correct construction and prevent problems that may affect public health. Inspection of private wells, many times as a result of a citizen's complaint about water quality, has shown that about 30 percent of the wells examined were not grouted correctly. Other requirements of existing well regulations were not met in more than half the wells examined. DHEC is gathering data on the problems associated with private well construction to determine if changes are needed in the way well construction is regulated.

Impacts of Septic Tanks

About half of the state's population depends on septic tanks to safely treat waste. Historically, when there is no obvious source of water quality problems, septic tanks are blamed. This speculation has generally not been supported by observation and testing. A recent study in Lake Murray, prompted by a suspicion that the increasing number of these private systems were affecting water quality, found no evidence of impact. This work supported an earlier study that showed septic tanks contribute about 4 percent of the nonpoint source load. The regulations related to the use and design of septic tanks are being reviewed to ensure that a multidisciplinary approach is used to address all factors, including population density, groundwater, surface water, and geology.

National Ambient Air Quality Standards, Particulate Matter and Ozone

The application of the new ozone standard to the data from recent years indicates that meeting the new standard will be more difficult, particularly in the upstate and midlands urban areas.

Little sampling has been done to compare our air quality with the new $PM_{2.5}$ standard. A new sampling network of about 25 samplers must be in place and operating by 2000. Sampling will focus on measuring the exposure in the larger population centers, but the network will include rural areas and sampling for background and regional transport.

More work will be required to better understand the nature of ozone formation and transport and determine the makeup of the fine particulate in South Carolina before the best strategy to limit precursors and sources can be determined.

Source Water Protection

As a result of 1996 amendments to the Safe Drinking Water Act, protection of source waters has become a national priority. South Carolina must develop a plan by December 1998 to define the boundaries of areas providing water for public water systems and determine the susceptibility of public water systems to certain contaminants identified in those areas. Implementation of this plan will involve state and local governments, water suppliers, and local communities.

Water Quality Restoration and Classification Upgrades

DHEC monitoring has shown that some waters do not meet water quality standards. Water quality measurements may reflect natural background conditions or the effects of point and nonpoint sources. The restoration of water quality

is an important, but complex, issue. DHEC is currently cooperating with other state and federal agencies to investigate possible restoration of some shellfish areas. DHEC will also continue to pursue reclassification of specific waterbodies to more protective classifications as prescribed by water quality and desired uses.

Beach Renourishment

Erosion continues to eat away the state's beaches. The most technically sound way to ward off the effects of beach erosion is by replenishing sand to maintain the natural protection of a wide beach and dune system and provide a wider beaches for recreation. This year a three-year effort to replenish the Grand Strand will end. Also, a $1.6 million allocation will culminate in the renourishment of Pawleys and Sullivans islands.

Nationally, beach renourishment projects are funded through the Army Corps of Engineers, and typically require matching money from local sources. The General Assembly reviews requests for state appropriations, basing approval on available funds. To protect the contribution healthy beaches make to the tourism industry, the ultimate goal will be to find a recurring source of funding for beach renourishment projects.

Ocean Water Bacteria Sampling Program

In early 1997, DHEC convened a group of water quality experts, microbiologists and representatives from coastal governments to determine if there were a need to revive the ocean water monitoring program. The group agreed that baseline sampling should be conducted that summer. Several local coastal governments volunteered to collect samples.

Results showed that surf water at Kiawah, Sullivans, Isle of Palms, Dewees and Pawleys, where there are no stormwater outlets, had bacteria counts consistently below the EPA acceptable risk level. Surfside, Myrtle, North Myrtle and unincorporated Horry County, where there are stormwater outlets, often exceeded the acceptable risk level during wet weather. As a result of the public concern and findings, DHEC has requested state funding for a beach water quality monitoring program for areas where human exposure can occur. With a surf quality network, the state could assure visitors of water safety and would have a way to reduce the human health risk of exposure to harmful bacteria.

Indicators, continued from Page 18

the Federal Clean Water Act. The report is required every two years and contains, among other measures, a set of indicators, expressed as a percentage of state waters that support certain uses. Depending on water quality criteria for each category, the ability of a waterbody to support aquatic life, recreational uses (swimming), and fish consumption is expressed as miles of stream or area of lake and estuary determined to be supporting, partially supporting or not supporting that use. The extent of the water represented by each monitoring location is determined and the sum of those portions applied to the total state waters. Unfortunately, the basis for the indicator changes too often to allow meaningful tracking of progress. The EPA miles for South Carolina have changed with each of the last assessments. From 1992 to 1996, the length of our rivers went from 9,900 to 35,461 and then down to 29,898 miles. The indicator may be useful for comparing states on any given year if states have similar monitoring programs, but long-term tracking of progress is difficult.

- **Pollutant Standard Index — PSI** (state) The PSI is provided for Greenville/Spartanburg, Columbia and Charleston and 70 other metropolitan areas across the nation. It was designed by the EPA to report daily air quality referenced to the national standards. It uses only the highest of the available measurements and does not attempt to account for the effects of combinations of pollutants. A PSI of 100 corresponds to a measurement at the national standard and the possibility of a health threat for some people. In 1996 there was only one day that had a PSI of 100 or more in South Carolina. On that day, the pollutant was ozone.

The use of indicators is inevitable. They all serve a purpose and can often provide the information we need to make a decision or that we want to keep informed or follow a trend. It is important to be aware of what information and assumptions are behind the index if the indicator is to be used to its best advantage.

A Message from the Commissioner

"...it's also up to each of us as citizens to make sure that our time on earth leaves a planet with clean air, water and land ready for the next generations."

In this, our second "state of the environment" report, we have presented ways we can reduce our impact on the state's air, land and water. By paying close attention to the minor things we do, we can each do our part to avoid major problems for ourselves and the environment of the future. In this report we also have addressed some issues of critical concern.

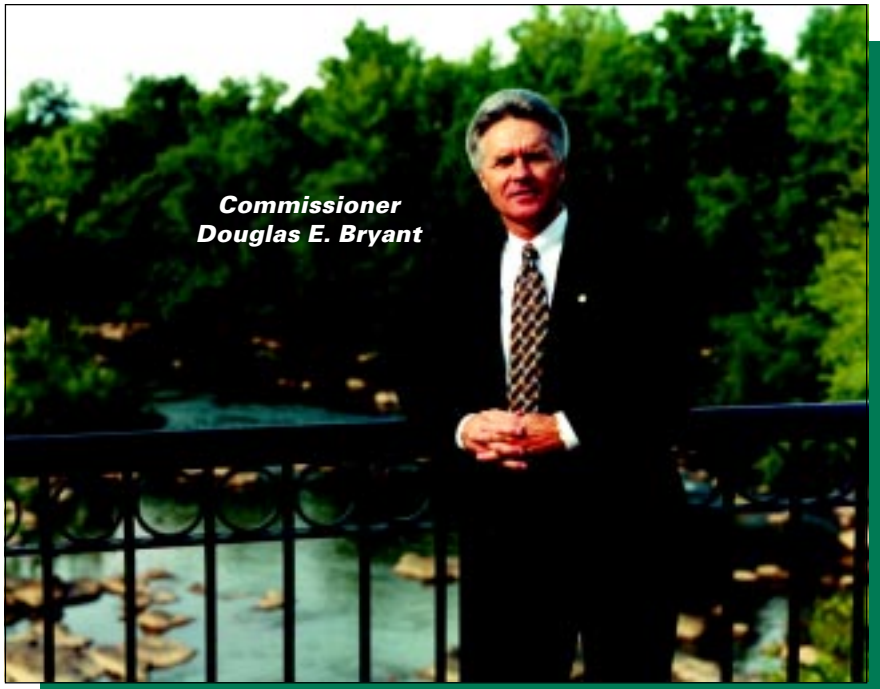
Our state is one of the few in the nation that meets all current air quality standards, but it may not stay that way. Stricter standards for smog and new standards for soot may impact areas across the state. We must remain aware of the impact transportation and our habits have on our communities, state and the region.

We must make hard decisions to protect our coastal areas. By the year 2015, it is estimated that the state's coastal population will rise to more than 1 million. We must manage this growth while minimizing the impact as much as possible. We have to make the correct decisions regarding land use, docks and marinas to ensure protection of our salt marshes and estuaries. We must continue our efforts to reduce the human impact on our groundwater and surface water, including cleaning up leaking underground storage tanks and reducing the amount and concentration of pollution in runoff.

Great progress has been made, but everyone must contribute if we are to reach waste reduction goals. If we keep pace, we will reach and may exceed the state solid waste reduction goal of 30 percent. Our Brownfields initiative has taken off in the past year, providing incentives for companies to "recycle" abandoned contaminated sites by cleaning them up and bringing them back into productive use. Our environmental curriculum has trained more than 6,000 teachers who will reach the state's schoolchildren with the message that we must protect our resources.

It is DHEC's mission to make sure that we permit and monitor activities in the state to prevent harm to the environment and human health. But it's also up to each of us as citizens to make sure that our time on earth leaves a planet with clean air, water and land ready for the next generations. It's up to federal, state and local governments to establish public policies, but every citizen must set individual personal policies that collectively will contribute to progress toward that goal.

I offer my thank you to all the dedicated staff who keep watch over the state's environment, and I thank the state's citizens who continue to support and do their part to preserve and protect the environment of South Carolina.



Commissioner Douglas E. Bryant

"We promote and protect the health of the public and the environment."
— DHEC Mission Statement

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

Information Resources

Points of Contact at DHEC

In addition to EQC district offices, DHEC's six liaisons provide a contact point for citizens and businesses for assistance in accessing and understanding the complexities of health and environmental issues.

Alice Truluck serves as a contact for the regulated community, community groups and citizens regarding concerns and questions on **agency policies and regulations.** She is also director of the agency's Freedom of Information Center. She can be reached at (803) 734-4880.

Lillian Mood coordinates the **risk communication** program within Environmental Quality Control. She is a key contact for citizens who have questions or concerns about environmental activities in their communities and possible health effects. She can be reached at (803) 734-5440.

Willie J. Morgan is DHEC's **permitting** liaison. Morgan is responsible for coordinating the permits that businesses and industries need from any — or all — DHEC program areas. He serves as the primary contact and advocate for the regulated community and can be reached at (803) 734-5179.

F. Ann Ragan is responsible for coordinating activities involving **federal facilities** and is the primary contact for the Department of Energy, Department of Defense and other interested parties on cleanup, permitting and compliance issues. She can be reached at (803) 734-4721.

Donna Gulledge is the state's **Small Business Ombudsman**. She serves as advocate for small businesses, providing referrals to appropriate technical staff, outreach on regulations and resolving small business problems. She can be reached at (803) 734-5909 or 1-800-819-9001.

William R. "Bill" Krecker is the state's **enforcement** liaison. He coordinates enforcement activities involving the state's regulated community and assists with planning and development of legislation. He can be reached at (803) 734-5279.

More Resources

The Center for Waste Minimization averages 70 on-site visits a year and about 300 opportunities to assist businesses and industries reduce or prevent waste**.** For more information, contact the center at (803) 734-4715.

The Small Business Assistance Program helps small businesses find out what regulations apply to them and helps them comply with state and federal laws. The SBAP serves as an advocate for small businesses. For more information on this free, nonregulatory service, call (803) 734-5909 or 1-800-819-9001, or visit the web page at www.state.sc.us/dhec/sbap.htm

South Carolina's nationally recognized environmental curriculum*: Action for a Cleaner Tomorrow: A South Carolina Environmental Curriculum Supplement* was developed by S.C. DHEC's Office of Solid Waste Reduction and Recycling in conjunction with a statewide team of teachers, the S.C. Department of Education, Clemson University Extension Service and the state "Keep America Beautiful" affiliate. For more information, call 1-800-768-7348.

The Freedom of Information Office: In order to ensure open access, accountability, and timely and appropriate response to the public, requests for information are coordinated through a Freedom of Information Center. The FOI Center is located at the DHEC Central Office Building, 2600 Bull St., Columbia, SC 29201. The center can be reached at (803) 734-5376.

Dry-cleaning Trust Fund: Drycleaners can qualify for cleanup funds generated by their industry as a result of the S.C. Dry-cleaning Restoration Trust Fund. For more information on the fund, call (803) 896-4050.

DHEC's Educational Resource Center has available information, materials and films about health and environment. More than 1,000 titles, covering general subjects such as air and water quality and specific environmental topics such as radon, can be accessed by the public. Some materials are suitable for children and classroom use. For more information on this resource, contact the ERC at DHEC, Robert Mills Complex, Box 101106, Columbia, SC, 29211 or call (803) 737-3941.

Access EQC

DHEC has established an electronic bulletin board that provides current information on Environmental Quality Control (EQC) programs and regulations. The bulletin board can be accessed by dialing (803) 734-3752 and can be used 24 hours a day to access a variety of information, including permit application forms, program area contacts, small business assistance program information, waste minimization information, and a summary of the permit applications received by EQC. For more information, call (803) 734-4639.

Visit the DHEC Home Page

www.state.sc.us/dhec/

DHEC's home page on the World Wide Web contains information about the agency, including contacts and phone numbers of the experts who can answer your health and environmental questions.

On DHEC's Environmental Page you will find:

- *Publications*
- *Guidance documents, policies, statutes, regulations*
- *Permit applications*
- *Lists of permits issued and monitored by the agency*
- *Activities for children*
- *Schedules of telecourses, seminars and workshops*

Environmental Responsibilities

Ocean and Coastal Resource Management
(803) 744-5838

- Assures compliance with the Coastal Zone Management program
- Reviews permit applications in critical coastal zones
- Participates with the U.S. Army Corps of Engineers in beach renourishment projects
- Undertakes special area management plans

Bureau of Air Quality
(803) 734-4750

- Designs, implements emission control regulations
- Issues construction and operation permits
- Conducts compliance inspections

Bureau of Water
(803) 734-5300

- Reviews new water system plans and inspects them during and after construction
- Ensures dischargers have proper wastewater treatment systems
- Conducts routine monitoring program
- Monitors rivers, lakes and streams

Bureau of Land and Waste Management
(803) 896-4000

- Issues permits for mines and hazardous, infectious, radiological and solid waste programs
- Monitors for compliance
- Assures proper waste disposal
- Responds to environmental emergencies

Bureau of Environmental Services
(803) 734-5383

- Performs inspections, responds to emergencies
- Investigates citizen complaints, collects and analyzes samples
- Performs ambient air and radiological monitoring

DHEC Publications, Reports

(Some documents are available in limited quantities and may require a copying charge. To order, please check your selections on the enclosed return card and drop it in the mail.)

Environmental Permitting in South Carolina

The State of South Carolina Water Quality Assessment Pursuant to Section 305(b) of the Federal Clean Water Act, March 1996

Watershed Water Quality Management Strategy: Savannah-Salkehatchie Basin, Technical Report No. 002-93

Watershed Water Quality Management Strategy: Saluda-Edisto Basin, Technical Report No. 003-95

Watershed Water Quality Management Strategy: Catawba-Santee Basin, Technical Report No. 002-96

Ambient Groundwater Quality Monitoring Network 1997

Ground-Water Contamination Inventory 1997

South Carolina Recycles: A Directory of Recycling Programs and Markets

Annual Reports:

1996 Nuclear Facility Environmental Radiation Monitoring

South Carolina Air Quality, 1996

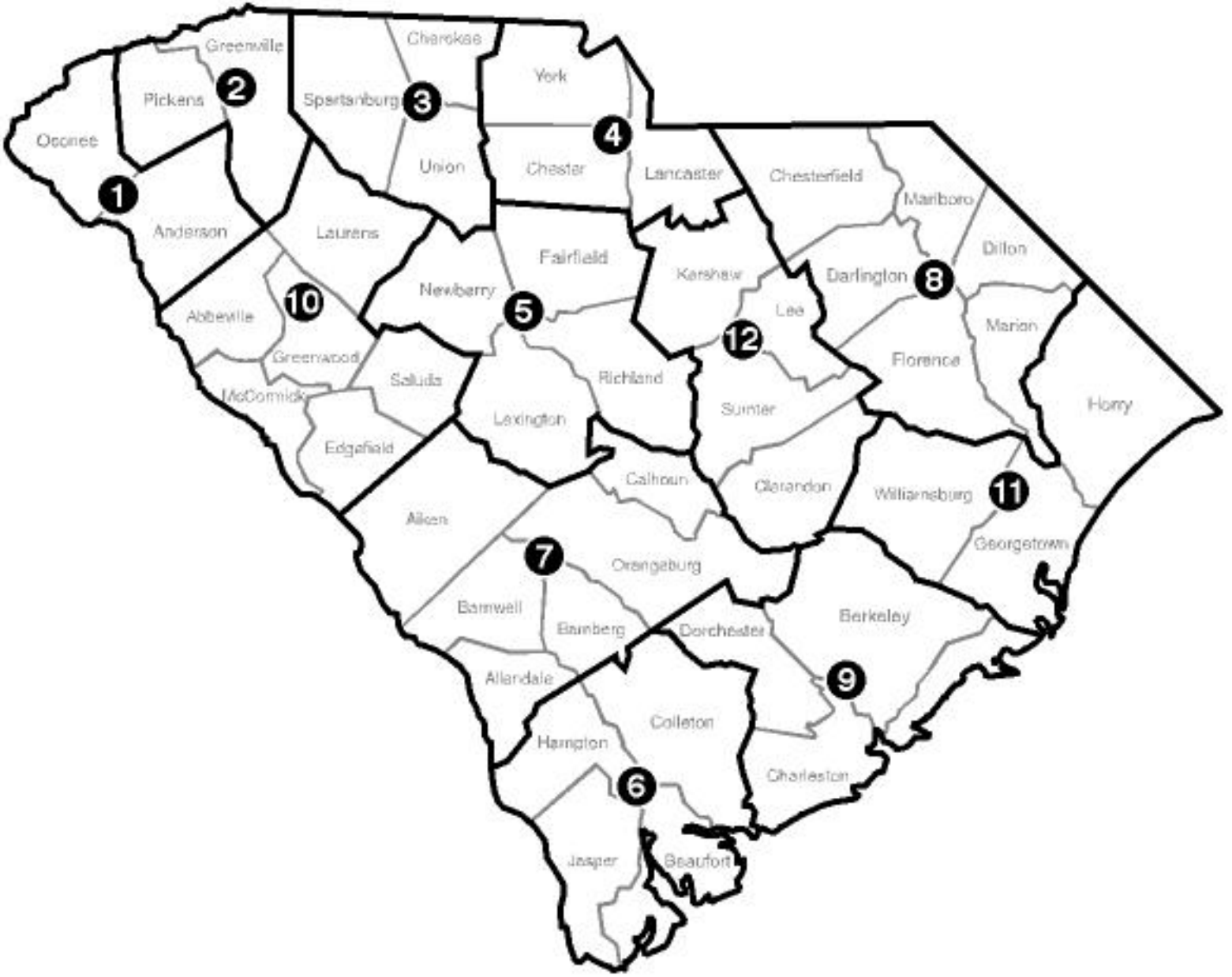
Used Oil Collection in South Carolina 1996 Annual Report

Action for a cleaner tomorrow. Progress Report 1997

1996 Solid Waste Management Annual Report

Making a Difference: Hazardous Waste Contingency Fund Activities

Environmental Quality Control Districts



1. ***Appalachia I***
(Anderson, Oconee)
(864) 260-5569

2. ***Appalachia II***
(Greenville, Pickens)
(864) 241-1090

3. ***Appalachia III***
(Cherokee, Union, Spartanburg)
(864) 596-3800

4. ***Catawba***
(Chester, Lancaster, York)
(803) 285-7461

5. ***Central Midlands***
(Fairfield, Lexington, Newberry, Richland)
(803) 935-7015

6. ***Low Country***
(Beaufort, Colleton, Hampton, Jasper)
(803) 522-9097

7. ***Lower Savannah***
(Aiken, Allendale, Bamberg, Barnwell, Calhoun, Orangeburg)
(803) 641-7670

8. ***Pee Dee***
(Chesterfield, Darlington, Dillon, Florence, Marion, Marlboro)
(803) 661-4825

9. ***Trident***
(Berkeley, Charleston, Dorchester)
(803) 740-1590

10. ***Upper Savannah***
(Abbeville, Edgefield, Greenwood, Laurens, McCormick, Saluda)
(864) 223-0333

11. ***Waccamaw***
(Georgetown, Horry, Williamsburg)
(803) 448-1902

12. ***Wateree***
(Clarendon, Kershaw, Lee, Sumter)
(803) 778-1531